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09/600,890

08/16/2000

Seiji Shirai

P19797

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06/18/2003

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EXAMINER

DINH, TUAN T

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary****Application No.**

09/600,890

**Applicant(s)**

SHIRAI ET AL.

**Examiner**

Tuan T Dinh

**Art Unit**

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06 May 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-3,5-12,14-19 and 21-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3,5-12,14-19 and 21-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendment*

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

### *Specification*

1. The disclosure is objected to because of the following informalities:

Page 1, lines 17, 25, and 30, please insert "space" between each word.

Page 2, line 2, change "interlaminar rein insulating layer" to --interlaminar insulative resin layer--.

Page, lines 6, 13, and 18, please insert "space" between each word.

Pages 3-4, line 20, please insert "space" between each word.

Page 6, lines 7, 12, and 25, please insert "space" between each word.

Page 7, lines 24, 29, please insert "space" between each word.

Page 8, lines 2, 14, 16, and 24, please insert "space" between each word.

Page 9, lines 15, lines 15, 29, please insert "space" between each word.

Page 10, lines 5, 12, please insert "space" between each word.

Page 11, lines 5, 8, and 21, please insert "space" between each word.

Page 12, lines 3, 5, 13, 18, 21, 22, and 25, please insert "space" between each word.

Page 13, line 3, please insert "space" between each word.

Page 14, lines 6, 31, 32, please insert "space" between each word.

Page 17, lines 2, 20, please insert "space" between each word.

Page 18, lines 20, 32, please insert "space" between each word.

Page 19, lines 12, 25, 26, 29, please insert "space" between each word.

Page 20, lines 22, 30, please insert "space" between each word.

Page 22, lines 8, 20, 26, please insert "space" between each word.

Page 23, line 31, please insert "space" between each word.

Page 24, lines 3, 4, 6, 7, 10, 11, please insert "space" between each word.

Page 26, lines 2, 13, 20, 28, 29, 31, please insert "space" between each word.

Page 27, lines 16, 17, 27, please insert "space" between each word.

Page 28, line 26, please insert "space" between each word.

Page 30, line 14, please insert "space" between each word.

Page 32, line 29, please insert "space" between each word.

Page 33, lines 9, 10, please insert "space" between each word.

Page 35, line 24, please insert "space" between each word.

Page 36, lines 36, 7-10, 19, 20, please insert "space" between each word.

Page 37, line 30, please insert "space" between each word.

Page 39, lines 10, 14, please insert "space" between each word.

Page 40, lines 14, 30, please insert "space" between each word.

Page 43, lines 5, 26, please insert "space" between each word.

Page 44, lines 9, 10, 25, please insert "space" between each word.

Page 45, lines 9, 25, 27, please insert "space" between each word.

Page 47, lines 13, 28-30, 32, please insert "space" between each word.

Page 48, line 30, please insert "space" between each word.

Page 50, line 4, please insert "space" between each word.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-2, 6-11, 15-18, 22-25, 27-28, 30, and 32-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Uno et al. (U. S. Patent 5,827,604, hereafter Uno).

As to claims 1-2, 8-10, Uno discloses a multilayer printed wiring board (1, column 5, lines 18-19) and also shown in figures 1-8 comprising:

conductor circuit layers (3-figure 1, column 5, lines 19-20) each having a thickness and a surface and interlaminar insulative resin layers (4-figure 2, column 5, lines 20-21) deposited alternately one on another, the interlaminar insulative resin layers (4) each having through hole (7 or 11, column 13, line 10, column 14, line 63) having an inner wall (4a-see figure 3) wherein the inner wall (4a) is roughened surface,

filled with a plating layer (6, column 13, lines 8-9) to form a viahole having a diameter (100  $\mu\text{m}$ ), wherein

the surface of said plating layer (6) extending out of the through hole and lying in a substantially same level as the surface of the conductor circuit layer (see figure 5) disposed in the interlaminar insulative resin layer (4) in which the plating layer (6) also lies;

at least one of the surface of the conductor circuits (3) is roughened (uneven layer is a roughened layer (9) as a roughened surface of a conductor layer 3-see figure 1) to a depth of 1 to 10  $\mu\text{m}$  (column 3, lines 42-44, column 7, lines 8-29); and

the thickness of said conductor circuit layer is less than 25  $\mu\text{m}$  or less than a half of the viahole (11) diameter (viahole 11 has a diameter~100  $\mu\text{m}$ ).

As to claims 17, 24, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 comprising:

conductor circuit layers (3-figure 1, column 5, lines 19-20) each having a thickness and a surface and interlaminar insulative resin layers (4-figure 2, column 5, lines 20-21) deposited alternately one on another, the interlaminar insulative resin layers (4) each having through hole (7 or 11, column 13, line 10, column 14, line 63) having an inner wall (4a-see figure 3) wherein the inner wall (4a) is roughened surface, filled with a plating layer (6, column 13, lines 8-9) to form a viahole having a diameter (100  $\mu\text{m}$ ), the thickness of the conductor layer is less than 25  $\mu\text{m}$ , wherein

said roughened inner wall (4a) is cover with a roughened electroless plating layer (9), and an inner space of said through hole (7; 11) defined by the electroless plating layer (9) and is filled with an electroplating layer (10).

As to claims 25, 27, 30, and 33, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 comprising:

conductor circuit layers (3-figure 1, column 5, lines 19-20) each having a thickness and a surface and interlaminar insulative resin layers (4-figure 2, column 5, lines 20-21) deposited alternately one on another, the interlaminar insulative resin layers (4) each having through hole (7 or 11, column 13, line 10, column 14, line 63) having an inner wall (4a-see figure 3) wherein the inner wall (4a) is roughened surface, filled with a plating layer (6, column 13, lines 8-9) to form a viahole having a diameter (100  $\mu\text{m}$ ), the thickness of the conductor layer is less than 25  $\mu\text{m}$ , wherein

said interlaminar insulative resin layers (4) being formed from a composite of thermosetting resin and heat-resistance thermoplastic resin (see column 7).

As to claims 6, 22, Uno discloses the multiplayer wiring board disclosed in figures 1-5 wherein the interlaminar insulative resin layer is made of thermoplastic resin or a composite of thermoplastic and thermosetting resins (column 9, lines 10-14).

As to claims 7, 16, 23, 32, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 wherein a ratio between a viahole diameter (100  $\mu\text{m}$ ) and an interlaminar insulative resin layer thickness (40 or 50  $\mu\text{m}$ , column 14, lines 51-62) being within a range of 1 to 4.

As to claims 11, 18, 28, Uno discloses the multiplayer wiring board (1) as shown in figures 1-5 wherein a depression is formed on a central surface portion of the plating layer surface (6) extending out of the through hole.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 3, 12, 19, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uno ('604) in view of Frankeny et al. (U. S. Patent 5,509,200).

Uno discloses all of the limitations of the claimed invention, except for the plating layer surface being roughened.

Frankeny shows a plating layer (12) having a roughened surface disclosed in figures 7, 9-12.

It would have been obvious to one having a roughened surface on a plating layer as taught by Frankeny to employ the multiplayer wiring board of Uno in order to provide a reliable electrical connection, seal a boundary and bind two or more stackable layers into the multiplayer circuit board.

6. Claims 5, 14, 21, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uno (604) in view of Kinoshita (U. S. Patent 6,127,633).



Uno discloses all of the limitations of the claimed invention, except for a further viahole is formed in the viahole.

Kinoshita shows a structure of a multiplayer wiring board as shown in figures 1-6 comprising a further viahole (15a; 17a/b) is formed in a viahole (13a).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have teaching's Kinoshita to employ the multiplayer wiring board of Uno in order to provide an electrical contact of each layer of a multiplayer wiring board.

7. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uno ('604) in view of Nagamatsu et al. (U. S. Patent 4,769,270).

As to claim 26, Nagamatsu shows the insulating layer (2) is made of a composite of fluororesin fiber cloth (4, column 2, lines 41-42), wherein said cloth comprises voids (apertures 11, column 2, line 62), and wherein thermosetting resin (column 3, lines 1-4) is impregnated in the voids in the cloth.

It would have been obvious to have the material (claim 26) as taught by Nagamatsu to employ the multiplayer wiring board of Uno in order to achieve high performance in a high region has been desired.

### ***Response to Arguments***

8. Applicant's arguments with respect to claims 1-3, 5-12, 14-19, and 21-33 have been considered but are moot in view of the new ground(s) of rejection.

**Examiner disagrees.**

The new reference cited of Uno ('604) discloses a roughened surface (9) of the conductor circuit layer (3) having a depth between 1-10 um (see column 3 and 7), a composite of thermosetting resin and heat resistance thermoplastic resin (see column 9).


**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan T Dinh whose telephone number is 703-306-5856. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on 703-305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-1341 for regular communications and 703-305-1341 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

TD  
June 13, 2002.



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